

Protozoan Diversity In Deepor Beel, Assam, India

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Abstract: Among various riverine wetlands, Deepor Beel is one of the significant and vital wetlands in the Brahmaputra valley of lower Assam, India. The present study document 14 species of protozoa belonging to 9 families.

Index Terms: Protozoa, Deepor Beel, Arcellidae, Centropyxidae, Diffugiidae, Nebelidae, Euglephidae, Gymnodiniidae, Peridiniidae, Euglenidae, Parameciidae

1. INTRODUCTION

Protozoa found in almost every aquatic habitat, from cesspit to mountain circulation from lawn birdbath to the Amazon. Natural communities usually include dozens of species, and this variety retained while collections made in massive jars and back to the laboratory. The richness is expressed as a dazzling array of body bureaucracy, reflecting the total variety of niches occupied. The number of species, the variety of individuals within every species, and the kinds of species can all offer treasured insights into the character of the habitat from which a pattern become taken. For those motives, protozoa can be a handy source of matter to illustrate organic standards [1]. Protozoans are commonplace predators on bacteria and fungi [2], having the role of nutrient cycles [3]. Protozoans feed on and regulate the abundance of maximum kinds of aquatic microbes, and they are a fundamental part of all aquatic microbial food webs. They also have an extended history of use as indicators. By using nature, those occur in massive numbers in a wholly constrained pattern quantity, and many biological signs typically utilized in tracking and impact evaluation studies are organisms like mollusks, polychaetes, microorganisms, which might be logistically challenging to collect and luxurious to examine. The loose-living protozoans in chief include rhizopods and ciliates, which have a much broader distribution in freshwater environments. Best characterization and monitoring of all aquatic environments are viable with using those minute organisms. Even though minute in size and reputedly insignificant, they tackle a wondrous type of form and shape. Because of their small length, they are once in a while rated as least essential. However, they play a useful and essential role inside the biosphere. However, their universal position may consider as blended as a few are useful, others dangerous, and few other borders lined. The useful forms of the protozoans represent essential links within the meals internet, are hired thoroughly in biological and medical research, act as signs of pollution

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and petroleum deposits, and they are undoubtedly right natural enemies of dangerous microorganism, assisting in soil fertility. A number of the protozoans are harmful as they cause dreaded sicknesses in humans and different organisms and intervene with the production of nitrate, thereby reducing soil fertility. They are taken into consideration to be the first animals to conform and, as a result, have a particular region inside the evolutionary history of animals. Many scientists have been attracted closer to protozoa over the past a long time, and due to the availability of excellent equipment and technology, much information approximately them had been revealed. This expanded hobby in those creatures has had an incredible relating their class, which has gone through crucial modifications inside the present decade. The group protozoa raised to the extent of sub-state below the kingdom Protista. In order to understand or to use the protozoan community (particularly as an indicator of change) in teaching or research, it is necessary to be able to identify individual protozoa. Developing familiarity with the diversity of any group of organisms can be a daunting task.

2 MATERIALS AND METHODS

Survey area:

Deepor beel located within the coordination of 91°35' to 91°43' E. And 26°05' to 26°11' N. and lies on 165-186 feet above MSL [4]. It situated on the Southern bank of the river the Brahmaputra, and Village Maj Jalukbari, West Jalukbari, Dharapur, and National Highway No. 37 lie on the North; Southern Jalukbari, Tetelia and West Baragoan to the East; Gorbhanga Reserve Forest, Chakardew Hill and Chilla Hill to the South West and the Village Azara and Kahikuchi to the west [5]. The survey performed near the southern part of Jalukbari (station 1) and in and around Azara (station 2). This survey was performed from February 2017 to April 2017.

Methodology:

Culture media prepared by consulting literature [6, 7].

Solution A: The "hay infusion" is perhaps the most well-known culturing technique. One liter of pond water boiled. As the water comes to a boil, a small handful of hay was added and boiled for ten additional minutes. This boiling will break down the hay and set up an ideal medium for the growth of bacteria. Then the mixture allowed to stand for two to three days. After that, 500 mL of water sample added, this medium used for culturing *Paramecium caudatum*, *Arcella vulgaris*.

Solution B: 100 mL of pond water boiled for ten minutes. Then five grains of wheat were added to the cooled water. This mixture allowed standing in open dishes for two days and then inoculating this culture media with water samples, and this media used for other flagellates such as *L. spiralis*, *A. muscorum*, *E. tuberculata*, *T. lineare*, *G. aeruginosum*.

Solution C: 100 mL of pond water boiled for ten minutes. Then five grains of uncooked rice were added to the cooled water.

This mixture allowed standing in open dishes for two days and then inoculating this culture media with water samples. It used for *Paramecium caudatum*.

Solution D: An egg was boiled and ground a pinch (1/4 gram) of the yolk in a bowl with a little amount of water to form a paste. Then the paste was added to 1 liter of boiled pond water and allowed to stand for two days before inoculation, and this media used to culture flagellates such as *L. spiralis*, *A. muscorum*, *E. tuberculata*, *T. lineare*, *G. aeruginosum*.

Solution E: 250 mL of pond water boiled for ten minutes. Then the water was allowed to cool, and 2-3 drops of milk added. After mixing thoroughly, immediately inoculation was made. It used for *Paramecium caudatum*.

Solution F: 5 g of garden soil (free from chemical fertilizers) added to 300 mL of pond water. After that, green alga (*spirogyra*) added to the mixture, then only water sample added — this media used for *Diffugia* sp.

Solution G: Forty split peas were added to 1 L of distilled water and boiled for 10 minutes. After that, water was allowed to cool, and inoculation performed — this media used for *Euglena oxyuris*.

All the culture media were allowed to stand for 2-3 weeks.

Then the samples were thoroughly examined under the microscope from time to time.

The free-living ciliates observed in 10x and 40x magnifications using various stains such as Methylene green, Janus green, Neutral red. Methyl Cellulose, Polyvinyl alcohol used for immobilization of protozoan species. Then different species were observed, and photographs were taken and identified. Protozoa were identified following [8-12]. Rhizopoda identified following the works of Deflandre [13] and Chattopadhyay and Das [14] and Sharma and Sharma [15].

3 RESULTS AND DISCUSSION

From the present study, Protozoa presented 14 species belonging to 9 families and includes the members of two phyla, namely Sarcocystophora and Ciliophora. Of these, the former (13 species) form the main qualitative component, while the ciliates include only one species. In general, this study does not show rich Protozoa diversity of this Ramsar site as compared with those of certain state faunas studied by Das et al., [8-12] and identical with documented from fifteen floodplain lakes of the Brahmaputra river basin of Assam [15]. However, lack of detailed analysis of the protozoan species inventories from various freshwater ecosystems of India does not allow meaningful comparison of the present results for their ecosystem diversity. However, the number of 14 species still far less compared to 46 species found by the aquatic diversity of invertebrates of Deepor Beel [16]. It may be because this work is only carried out only for about three months, which is not sufficient to document all the species. As the study was carried out from February to April, when precipitation is low compared to June to September, so there is always going to be less diversity of species available for study. Sampling performed in two areas, which may not be enough for proper documentation of the species. Two species, i.e., *Assulina muscorum* and *Gymnodinium aeruginosum*, are new records from Assam, which supports the data found by Sharma and Sharma [16]. Several species indicate examples of regional distributional interest. The notable members of this category are those restricted to this region, and these include *Gymnodinium aeruginosum*, which is known to occur so far from India only in Manipur. *Euglena oxyuris* recorded from

Manipur, West Bengal, and Andhra Pradesh. Rhizopoda, the most diverse group of Protozoa, is represented by ten species belonging to 7 genera, five families, and two classes. The examined collections indicate 7 species of Lobosea and 3 species of Filosea, and register L/F quotient = 2.33 which is apparently lower than the value (3.0) reported by Sharma and Sharma [15] from various floodplain lakes of Assam but the same differs from its values ranging between 0.5-1.4 reported for moss dwelling Rhizopoda [14]. Diffugiidae>Euglephidae, two species families, comprise the dominant fraction (70%) of the rhizopods. Arcellidae, Centropyxidae, and Nebelidae, the least species families, include one species each. Total identification of protozoan species is somewhat lower than 16, 12, 7 and 19 species examined from the freshwater biotopes of Meghalaya [9], Loktak Lake—a Ramsar site [12], Sikkim [11] and Manipur [12] respectively. Further, the richness is higher to the reports of 16 species from Tripura [10]; 10 species from Melghat Wildlife Sanctuary [17], Maharashtra; 13 species from Pench National Park, Maharashtra [18] and also 7-16 species listed from 15 floodplain lakes of the Brahmaputra river basin of Assam [15]. *Diffugia corona* and *D. tuberculata* comprise examples of local or regional distributional interest. Further, these species exhibit rare occurrences in the collections. On the other hand, *Arcella vulgaris*, *Centropyxis ecornis*, *Diffugia acuminata*, *D. oblonga*, *Euglypha tuberculata* exhibit relatively common occurrence.

Sl. No.	SPECIES NAME	STATION 1			STATION 2		
		FEB	MAR	APR	FEB	MAR	APR
1.	<i>Arcella vulgaris</i>		+	+	+	+	+
2.	<i>Centropyxis ecomis</i>		+	+		+	+
3.	<i>Diffugia acuminata</i>			+		+	+
4.	<i>Diffugia corona</i>			+			+
5.	<i>Diffugia oblonga</i>			+	+		+
6.	<i>Diffugia tuberculata</i>		+	+	+		+
7.	<i>Lesquereusia spiralis</i>						+
8.	<i>Assulina muscorum</i>						+
9.	<i>Euglypha tuberculata</i>						+
10.	<i>Trinema lineare</i>						+
11.	<i>Gymnodinium aeruginosum</i>						+
12.	<i>Ceratium hirudinella</i>			+			+
13.	<i>Euglena oxyuris</i>			+	+		+
14.	<i>Paramecium caudatum</i>	+	+	+	+	+	+

Table 1: Protozoan species abundance

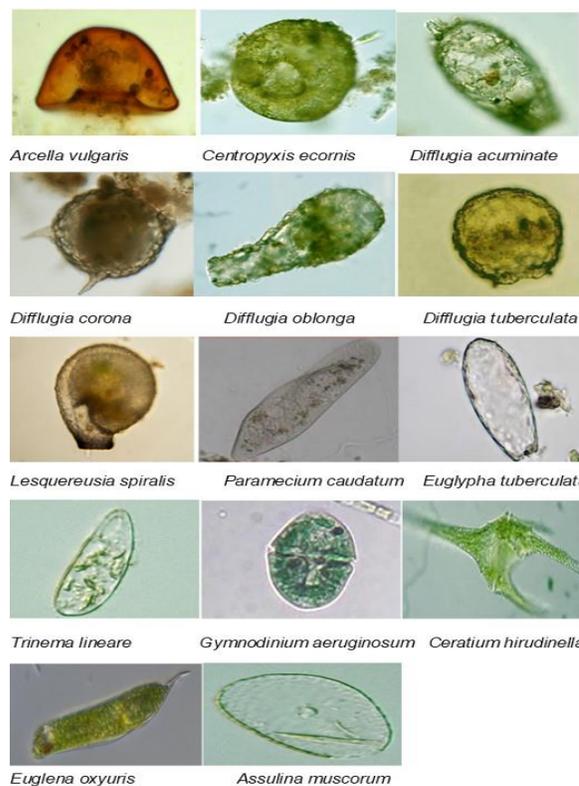


Fig 2. Photographs of collected protozoan species

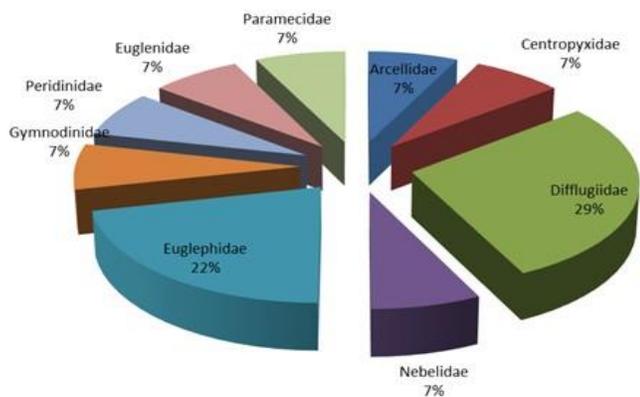


Fig 1: Family wise distribution of protozoan

Sl no.	Family	Scientific name
1	Arcellidae	<i>Arcella vulgaris</i>
2	Centropyxidae	<i>Centropyxis ecomis</i>
3	Diffugiidae	<i>Diffugia acuminata</i>
4	Diffugiidae	<i>Diffugia corona</i>
5	Diffugiidae	<i>Diffugia oblonga</i>
6	Diffugiidae	<i>Diffugia tuberculata</i>
7	Nebelidae	<i>Lesquereusia spiralis</i>
8	Euglephidae	<i>Assulina muscorum</i>
9	Euglephidae	<i>Euglypha tuberculata</i>
10	Euglephidae	<i>Trinema lineare</i>
11	Gymnodiniidae	<i>Gymnodinium aeruginosum</i>
12	Peridiniidae	<i>Ceratium hirudinella</i>
13	Euglenidae	<i>Euglena oxyuris</i>
14	Parameciidae	<i>Paramecium caudatum</i>

Table 2: Protozoan species collected from the survey site

4. CONCLUSION

The existing file is declaring the biodiversity price of this Ramsar site. The loose-living protozoans are effective bioindicators that found in nearly all sparkling water bodies in which they multiply in large numbers and for that reason, are adapting to the modifications in an aquatic body. With them, the fame of a wetland's environment may detect in the value of a mile efficient way. They can monitor well and expertise the ecological approaches. Considering that they may be green in massive metallic uptake, may be used as equipment of bioremediation of aquatic pollution. Globalization today has brought about the rising prospect of Biodiversity conservation, in particular, to stabilize the arena's financial system and also for preserving balanced habitat globally. Biodiversity plays a critical position in the economic system of a specific location, especially the soil, water, climatic situation, and forest cowl.

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